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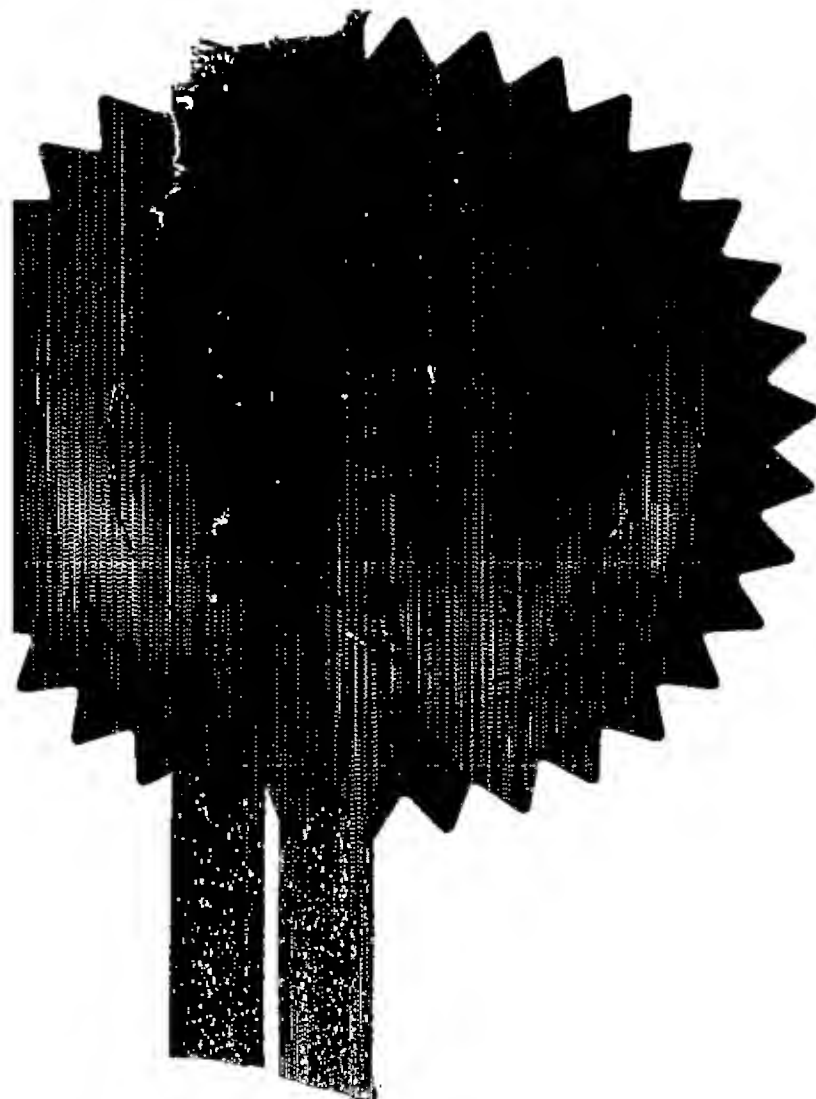
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2.	Patent application number (The Patent Office will fill in this part)	0401500.4		23 JAN 2004
3.	Full name, address and postcode of the or of each applicant ( <i>underline all surnames</i> )	Supreme Plastics Holdings Limited Supreme House 300 Regents Park Road Finchley London N3 2TL		
	Patents ADP number ( <i>if you know it</i> )	818 0622001		
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4.	Title of the invention	APPLICATION OF ZIPPERS TO FILM MATERIAL		
5.	Name of your agent ( <i>if you have one</i> )	W P Thompson & Co		
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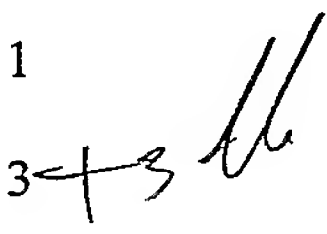
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Description 5

Claims 2

Abstract 1

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Date

W P Thompson & Co

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**Patents Form 1/77**

# APPLICATION OF ZIPPERS TO FILM MATERIAL

This invention relates to methods of and apparatus for  
5 applying reclosable fastener profiles, otherwise known as  
zippers, to film material, where the zipper is applied  
transversely to the direction of movement of the film  
material.

Transverse web or cross-web technology is now well known,  
10 where a zipper is applied transversely to the longitudinal  
axis of a film, but by its very nature the inclusion of means  
to stop the film and apply the zipper makes a continuously  
operating unit inefficient.

It is therefore an object of the present invention to  
15 provide a method of and apparatus for applying the zipper  
while the film material or web is still moving at the normal  
line rate, thus maintaining the efficiency of the line  
operation.

Our co-pending international patent application  
20 PCT/GB2003/002158 describes and claims such an apparatus and  
method. The object of the present application is to provide  
further such apparatus and method.

According to the present invention there is provided an  
apparatus for applying a zipper strip to a film transversely  
25 to the direction of movement of the film, comprising means for  
producing continuous movement of the film in the said  
direction, applicator means arranged to receive the zipper  
strip, to present it to the film at a first location and to  
move with the film in the said direction to a second location,  
30 and sealing means arranged to move together with the  
applicator means in the said direction from the first to the  
second location to effect sealing of the zipper strip to the  
film during the said movement from the first to the second  
location, the applicator means and the sealing means being  
35 arranged for reciprocal return movement in a direction



opposite to the said direction from the second location to the first location.

Preferably, the application means and the sealing means are located at respective opposite sides of the film.

5       The sealing means conveniently comprises a heated sealing bar.

The applicator means and the sealing means may be reciprocally driven by a linear motor.

Conveniently, the applicator means is movable towards and  
10 away from the film in a direction substantially perpendicular to the said direction.

The invention also provides a method of applying a zipper strip to a film transversely to the direction of movement of the film, the method comprising moving the film continuously  
15 in said direction, presenting a zipper strip to the film at a first location by an applicator means, applying sealing means to the film at the first location, moving the applicator means and the sealing means together with each other in the said direction from the first to the second location to effect  
20 sealing of the zipper strip to the film during the movement from the first to the second location, and returning the applicator means and sealing means in a direction opposite to the said direction from the second to the first location.

An embodiment of the invention will now be described by  
25 way of example with reference to the drawings of this specification, in which:

Figure 1 is a somewhat schematic perspective view of an apparatus for applying zipper strips transversely to a moving web;

30       Figure 2 is a somewhat schematic perspective view of a horizontally-operating form-fill-seal packaging machine incorporating the apparatus of figure 1; and

Figure 3 is a schematic side view showing the operation of the apparatus of figure 1.

35       Figure 1 shows a web of plastics film 10 which is moving

continuously in the direction A shown by an arrow. A guideway 12 for a linear motor 14 is mounted beneath the film 10. The linear motor can be driven to move linearly in first and second, opposite directions B,B' shown by arrows.

5 A support platform 16 is mounted on the motor 14 and carries centrally a pneumatic cylinder 18, to which compressed air can be supplied by suitable pressure and control means (not shown). To each side of the cylinder 18, the platform carries a guide 20a, 20b, each of which consists of a piston-  
10 and-cylinder arrangement. Similarly, electrical control means control the motor 14.

The cylinder 18 and guides 20a, 20b carry at their upper ends a zipper applicator bar 22. The applicator bar 22 is movable below the film 10 in first and second, opposite -  
15 directions C,C' shown by arrows, the directions being perpendicular to the direction A of movement of the film 10. The applicator bar 22 has a longitudinal groove 24 which is shaped and dimensioned to receive lengths of zipper 26. The zipper 26 passes through the nip of counter-rotating drive  
20 rollers 28a, 28b which feed the zipper 26 into the groove 24. A reciprocating blade 30 cuts the zipper into sections of predetermined length, usually less than the width of the film 10. The zipper 26 consists of continuous lengths of interengaging releasable male and female fastener strips, for  
25 example of any of many known types.

A heated sealing bar 32 is positioned above the film 10 and is fixed relative to the platform 16. The sealing bar 32 is shaped along its lower edge 34 to align with the upper edge of the applicator bar 22 adjacent to the groove 24 in the  
30 applicator bar and thereby to apply heat to the film 10 at a location adjacent the location of a length of zipper 26 located in the groove 24 of the applicator bar 22 and presented to the film 10 by upward movement of the applicator bar 22.

35 Figure 2 of the drawings shows the general arrangement



of a horizontally-operating form-fill-seal packaging machine which includes the apparatus of figure 1 which is indicated by the reference numeral 50. The apparatus 50 is orientated with the applicator bar 22 uppermost in figure 2: any 5 orientation is possible. In the orientation of figure 2, a suitable vacuum device (not shown) is included to retain zipper lengths in the groove 24.

The film 10 is stored in a roll 52 which can rotate to allow the film to be drawn by a pair of feed rollers 54a, 54b 10 through the apparatus 50, whence it passes around further guide rollers 56a, 56b before being fed to a forming box 58 of a conventional horizontal form-fill-seal packaging machine. Articles 60 to be packaged are fed in the direction E shown by an arrow on a conveyor belt (not shown) to the forming box 15 58, where, in the conventional manner, the film 10 is folded around the article 60 and the longitudinal edges of the film 10 are brought together and sealed to each other to form a back seal. Subsequently to this, and at a location downstream of the forming box 58, the folded film passes 20 between a pair of heated cross-seal jaws 62a, 62b which form transverse seals between the inner faces of the folded film and also sever the film to provide individual sealed packages 64 containing the articles 60.

It should be mentioned that, in accordance with cross-web 25 technology, the zipper 26 is cut into lengths which are slightly less than one-half of the width of the film 10, the male and female profiles of the zipper lengths being engaged with each other. The lengths of zipper are located by the applicator bar 22 centrally of the film 12. Thus, when the 30 film is folded in the forming box 58, the portions of the film to each side of the zipper length form the sides and one face of the eventual package. The length of zipper is attached to what becomes the other face of the package, so that, by the operation of the cross-seal jaws, heat is applied to the first 35 face of the package to seal the zipper strip to that face and,

after that, the film is severed into individual packages. The packages thus have a transverse heat seal at each end and, positioned inwardly of one of the seals, an openable and reclosable seal formed by the zipper strips for use after opening of the package by breaking the adjacent heat seal.

Figure 3 of the drawings shows the operation of apparatus of figure 1. In figure 3, the film 10 is shown moving in the direction A. The applicator bar 22 is shown movable between its first and second limit positions 22', 22'', determined by the linear motor 12. The lengths of zipper 26 are presented to the applicator bar 22 when it is in its first limit position 22'. The bar is then raised by the pneumatic cylinder 18 in the direction C until it contacts the lower surface of the film 12. Further movement in the direction C results in movement of the film 10 against the sealing bar to apply sealing heat to the opposite face of the film 12, the lower edge of the sealing bar coming to rest on the upper (as shown in figure 1) edge of the applicator bar 22 adjacent the groove 24.

The applicator bar 22 and seal bar 32 are then moved in the direction B by the linear motor, until the second limit position 22'' is reached. During this movement, the speed of travel of the motor 14 and of the film 10 are equal to each other. At the second limit position 22'', the applicator bar 22 is moved away from the film 10 in the direction C', prior to its being returned to the first limit position 22' by movement in the direction B' by the linear motor 14. The cycle is then repeated to apply the zipper strips at spaced intervals along the length of the film 10. The motor 14 is capable of producing a very rapid acceleration and deceleration of the applicator bar 22 and the sealing bar 34, these taking place during the time taken for the movements in the directions C and C'.

**CLAIMS:**

1. An apparatus for applying a zipper strip to a film transversely to the direction of movement of the film, comprising means for producing continuous movement of the film  
5 ~~in the said direction, applicator means arranged to receive~~  
the zipper strip, to present it to the film at a first location and to move with the film in the said direction to a second location, and sealing means arranged to move together with the applicator means in the said direction from the first  
10 to the second location to effect sealing of the zipper strip to the film during the said movement from the first to the second location, the applicator means and the sealing means being arranged for reciprocal return movement in a direction opposite to the said direction from the second location to the  
15 first location.

2. An apparatus according to claim 1, in which the applicator means and the sealing means are located at respective opposite sides of the film.

20

3. An apparatus according to claim 1 or 2, in which the sealing means comprises a heated sealing bar.

4. An apparatus according to any preceding claim, in  
25 which the applicator means and the sealing means are reciprocally driven by a linear motor.

5. An apparatus according to any preceding claim, in which the applicator means is movable towards and away from  
30 the film in a direction substantially perpendicular to the said direction.

6. A method of applying a zipper strip to a film transversely to the direction of movement of the film, the  
35 method comprising moving the film continuously in said

direction, presenting a zipper strip to the film at a first location by an applicator means, applying sealing means to the film at the first location, moving the applicator means and the sealing means together with each other in the said  
5 direction from the first to the second location to effect sealing of the zipper strip to the film during the movement from the first to the second location, and returning the applicator means and sealing means in a direction opposite to the said direction from the second to the first location.

10

7. A method according to claim 6, in which the applicator means is moved at the first location in a direction substantially perpendicular to the said direction of movement of the film, in order to apply the zipper to the film and is  
15 moved in the opposite direction at the second location prior to its return movement to the first location.

8. An apparatus for applying a zipper to a film, substantially as hereinbefore described with reference to the  
20 drawings.

9. A method of apparatus for applying a zipper to a film, the method being substantially as hereinbefore described with reference to the drawings.

**ABSTRACT**

## APPLICATION OF ZIPPERS TO FILM MATERIAL

An apparatus for application of zippers to film material 10 comprises an applicator bar 22 for presenting pre-cut lengths of zipper 26 to the film and a heated sealing bar 32 for sealing the pre-cut lengths to the film. The applicator bar and sealing bar are mounted for movement with the film on a linear motor 14. A pneumatic cylinder 18 raised 10 the application bar towards the film 10. The application bar moves in direction C to apply the zipper to the film 10 moving in direction A, then moves with the sealing bar and the film in direction B, away from the film in direction C', back to its starting position in direction B', then towards the film 15 again in direction C after being loaded with a further length of zipper.

(Figure 1)

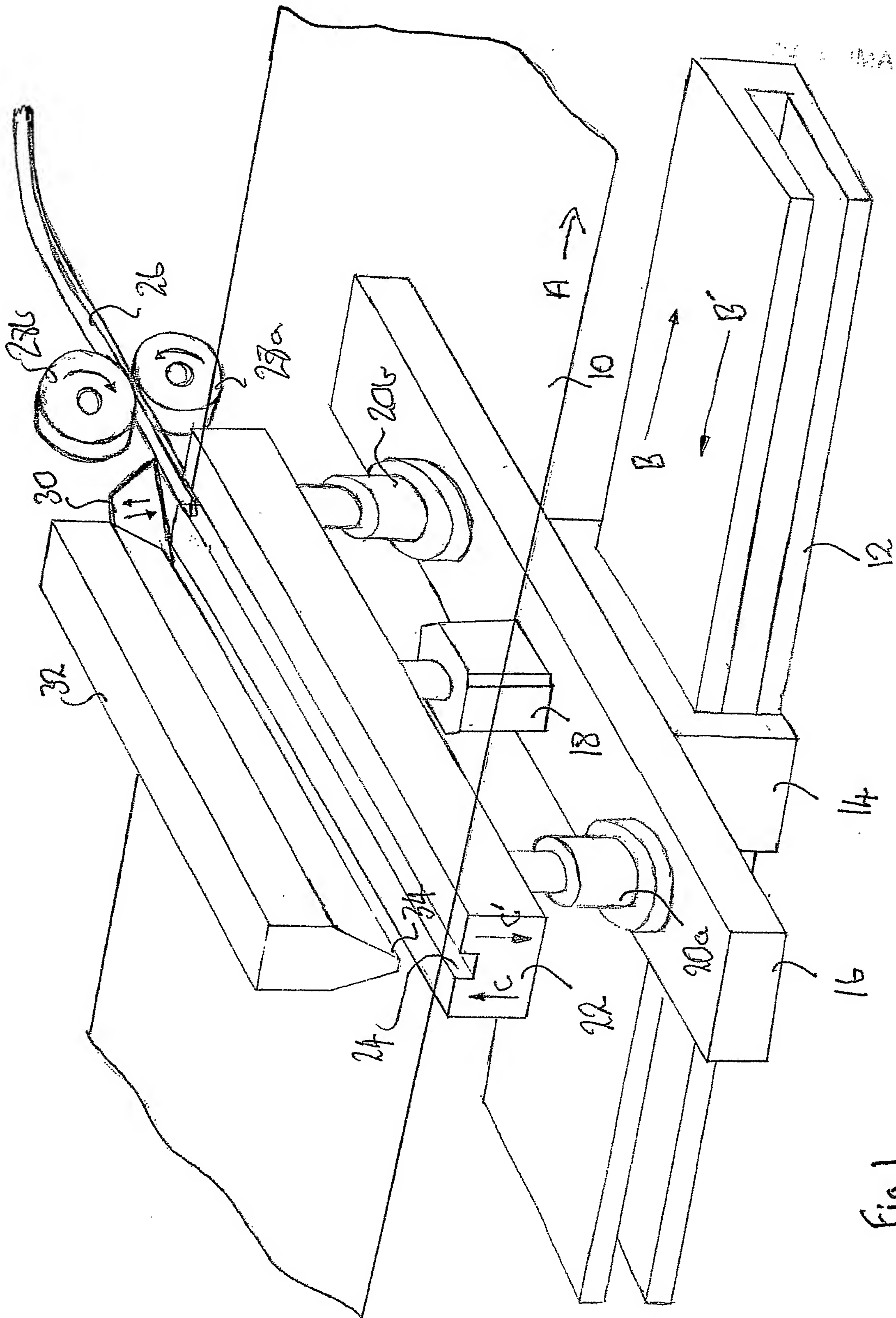


Fig. 1





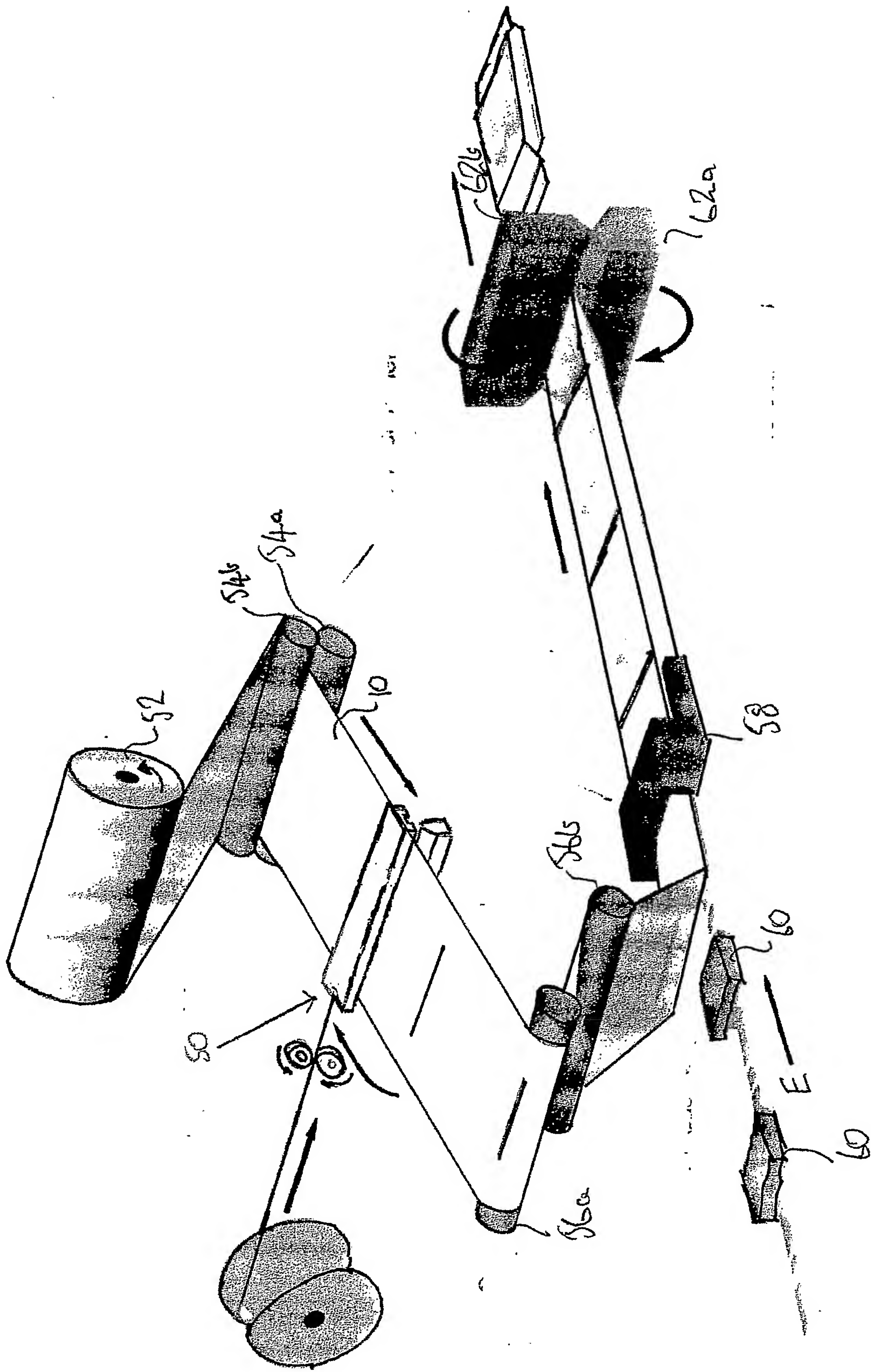


Fig. 2



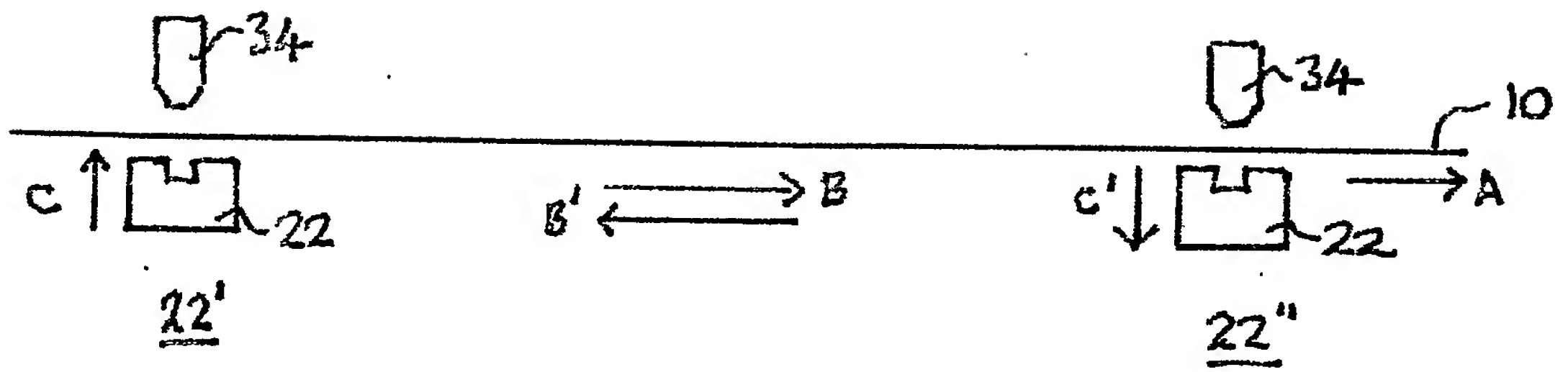


Fig. 3

